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ANTIMICROBIAL PROPERTIES FROM DIFFERENT PARTS OF *Ficus deltoidea*

By

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Thesis Submitted in Partial Fulfillment for the Degree of
Bachelor of Medical Laboratory Technology (Hons)
Faculty of Health Sciences
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2015

DECLARATION

I hereby declare that the work in this thesis is based on my original work and was carried out in accordance with the regulations of Universiti Teknologi MARA. This thesis has not been submitted to any other academic institution or non academic institution for any other degree student or qualification.

JULY, 2015

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TABLE OF CONTENTS

ABSTRACT

ANTIMICROBIAL PROPERTIES FROM DIFFERENT PARTS OF *Ficus deltoidea*

Antimicrobial agents from natural sources gained attention as antimicrobial resistance has become a growing issue. *Ficus deltoidea* is a traditional medicine plant that clinically proven has antimicrobial properties. However, determination of antimicrobial properties from different parts of *Ficus deltoidea* is needed, as it able to identify the part of the plant that possessed antibacterial properties against *Staphylococcus aureus* (ATCC 43300), *Bacillus cereus* (ATCC 14579), *Escherichia coli* (ATCC 25922), and *Pseudomonas aeruginosa* (ATCC 27853). Screening of antimicrobial activity of methanolic extract of the leaf, stem, fig, and root of *Ficus deltoidea* was made using disc diffusion method, followed by minimum inhibition concentration (MIC) and minimum bactericidal concentration (MBC) for sensitive organisms. The preliminary screening showed inhibition activity of all *Ficus deltoidea* parts against *Staphylococcus aureus* and *Bacillus cereus*, but negative results for *Escherichia coli* and *Pseudomonas aeruginosa*. The MIC of the leaf was considered as good against *Staphylococcus aureus* and *Bacillus cereus*, same as the fig and stem against *Staphylococcus aureus*. While the remaining plant parts were considered as moderate. The MBC test confirming bactericidal effects of all parts of *Ficus deltoidea* against both *Staphylococcus aureus* and *Bacillus cereus*. The leaf, stem, fig and root of *Ficus deltoidea* against *Staphylococcus aureus* has MBC value of 62.5mg/ml, 125mg/ml, 125mg/ml and 250mg/ml. While against *Bacillus cereus* have a value of 62.5mg/ml, 250mg/ml, 500mg/ml and 500mg/ml. This study reveals that *Ficus deltoidea* leaf, fig, stem and root extract have antibacterial activities against *Staphylococcus aureus* and *Bacillus cereus*, and could potentially be used as a natural antibacterial agent to treat bacterial infections.

Keywords: *Ficus deltoidea*; Mas Cotek; antimicrobial activity; inhibition; bactericidal

CHAPTER 1

INTRODUCTION

1.1 Background of Study

United States Centers for Disease Control and Prevention (CDC) defined antimicrobial agent as "all agents that act against all types of microorganism". The word antimicrobial was derived from Greek word which "anti" means against, while "mikros" means little, and "bios" means life. Antibacterial is one of the terms used under antimicrobial studies which defined as all agents that act against bacteria, which can be produced synthetically, semi-synthetic or from natural product of plants or animals (College of Veterinary Medicine, 2011). As antibacterial term was the most widely used and known in antimicrobial study, these two words were used interchangeably. Antibacterial agents can inhibit bacteria by interfering the metabolic function or the specific physiological character of the microorganism. Antimicrobial agents are extremely important and necessary in controlling worldwide bacterial infectious disease. However, development and spreading of resistant pathogens causing effectiveness of antibacterial diminished. Resistant to antibacterial agents threaten a very serious problem to public health. As bacterial developing antimicrobial resistant, more and more antibacterial agent become ineffective including the last resort drug (Mandal *et al.*, 2009). Thus, new antimicrobial from natural products including herbal plants-based can be used to replace antibacterial that are resistance to pathogenic bacteria as cited by Oyedeji *et al.* (2011).

Ficus deltoidea Jack is a plant from the family of Moraceae that have been used as medicine in the Malay Archipelago for various ailments. Traditionally, it has been used to treat wounds, rheumatism, sores, anti-diabetic treatment, contracting the uterus and vaginal muscles after birth, treat menstrual cycle disorders, relieve toothache, cold, and headache. It also used to treat leucorrhoea, a white discharge from vagina that are frequently related to bacterial infection by taking concentrated boiled water of dried leaf